

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listing of claims in the application.

1-43 (canceled)

44. (currently amended) An image fusing system comprising:

a camera having:

a common aperture arranged to allow target radiation to enter said camera along a common optical axis;

a beam splitter arranged to receive said target radiation passed through said common aperture and to split said target radiation into a first spectral band and a second spectral band which is different from said first spectral band, wherein said target radiation in said first spectral band is directed along a first optical path and said target radiation in said second spectral band is directed along a second optical path;

a first sensor arranged to receive said radiation in said first spectral band and to provide a first optical output representing a first optical image of said radiation filtered into said first spectral band, said first sensor comprising at least one of a charge coupled device or an image intensifier and generates said first optical output;

a first objective lens in said first optical path between said beam splitter and said first sensor, wherein said first objective lens is transmissive to radiation in at least a portion of said first spectral band;

a second sensor arranged to receive said radiation in said second spectral band and to provide a second optical output representing a second optical image

of said radiation filtered into a second spectral band, said second sensor comprising an infrared focal plane array (FPA) and a display to convert an electronic output of said FPA to a visible image corresponding to said second optical output;

a second objective lens in said second optical path between said beam splitter and said second sensor, wherein said second objective lens is transmissive to said radiation in at least a portion of said second spectral band;

~~wherein said target radiation is not filtered by any objective lens until after being split into said first optical path and said second optical path;~~

a beam combining device arranged to optically fuse said first optical output from said first sensor and said second optical output from said second sensor into a third optical output; and

a viewer for viewing said third optical output; wherein:

said first sensor and said second sensor share said common aperture such that parallax between said first and second sensors is substantially eliminated and said camera and said viewer are aligned along said common optical axis such that parallax between said camera and said viewer is substantially ~~eliminated~~.
eliminated;

said first spectral band comprises a visible and/or near infrared (VIS/NIR) image of said radiation;

said second spectral band comprises at least one of a short wave infrared (SWIR), medium wave infrared (MWIR) or long wave infrared (LWIR) image of said radiation; and

said beam combining device comprises a narrow band filter to pass substantially all green light from said first sensor at a peak wavelength of near 0.55 micrometers with a bandwidth of near ± 0.01 micrometers, and to reflect substantially all other visible light from said display of said second sensor to fuse

said VIS/NIR and SWIR/MWIR/LWIR images.

45. (canceled)

46. (canceled)

47. (canceled)

48. (canceled)

49. (canceled)

50. (previously presented) The image fusing system according to claim 44, wherein:

said second sensor further converts said radiation in said second spectral band into a second electronic output; and

said first sensor further converts said radiation in said first spectral band received by said first sensor into a first electronic output;

said image fusing system further comprises:

a processor arranged to electronically fuse or combine said first electronic output and said second electronic output into a third electronic output; and

a display device arranged to selectively display at least one of said first electronic output, said second electronic output or said third electronic output.

51. (previously presented) The image fusing system according to claim 50, further comprising:

a transmitter to wirelessly transmit at least one of said first, second, and third electronic outputs to a remote receiver.

52. (currently amended) An image fusing system comprising:

a camera having:

a common aperture arranged to allow target radiation to enter said camera along a common optical axis;

a beam splitter arranged to receive said target radiation passed through said common aperture and to split said target radiation into a first spectral band and a second spectral band which is different from said first spectral band;

a first sensor arranged to receive said radiation in said first spectral band and provide a first image of said radiation filtered into said first spectral band;

a first optical output derived from said first image;

an electro-optic camera to convert said first optical output to a first electronic output derived from said first image;

a second sensor arranged to receive said radiation in said second spectral band and provide a second image of said radiation filtered into said second spectral band; band, said second sensor comprising an infrared focal plane array (FPA) that derives a second electronic output from said image and a display to convert said second electronic output to a second optical output derived from said second image;

~~a second optical output derived from said second image;~~

~~a second electronic output derived from said second image;~~

a beam combining device arranged to optically fuse said first optical output and said second optical output into a third optical output;

a viewer for viewing at least one of said first optical output, said second optical output or said third optical output;

a fusion board having a processor arranged to electronically fuse or combine said first electronic output and said second electronic output into a third electronic output; and

a display device arranged to selectively display at least one of said first electronic output, said second electronic output or said third electronic output;
wherein:

said first sensor and said second sensor share said common aperture such that parallax between said first and second sensors is substantially eliminated and said camera and said viewer are aligned along said common optical axis such that parallax between said camera and said viewer is substantially eliminated; ~~eliminated~~.

said first spectral band comprises a visible and/or near infrared (VIS/NIR) optical and electronic image of said radiation from said first sensor;

said second spectral band comprises a short wave infrared (SWIR), middle wave infrared (MWIR) or a long wave infrared (LWIR) optical and electronic image of said radiation from said second sensor; and

said beam combining device comprises a narrow band filter to pass substantially all green light from said first sensor at a peak wavelength of near 0.55 micrometers with a bandwidth of near ± 0.01 micrometers, and to reflect substantially all other visible light from said display of said second sensor to optically fuse said VIS/NIR and SWIR/MWIR/LWIR images.

53. (previously presented) The image fusing system according to claim 52, further comprising:

a transmitter to wirelessly transmit at least one of said first, second or third electronic outputs to a remote receiver.

54. (previously presented) The image fusing system according to claim 52, wherein:

said common aperture comprises a common lens that is transmissive to at least a portion of said first spectral band and at least a portion of said second spectral band; and

said image fusing system further comprises:

a first relay lens in a first optical path between said beam splitter and said first sensor to

correct aberrations in said first spectral band; and

a second relay lens in a second optical path between said beam splitter and said second sensor to correct aberrations in said second spectral band.

55. (currently amended) The image fusing system according to ~~claim 52~~ claim 54, wherein:

said first spectral band comprises the visible and/or near infrared (VIS/NIR) band of said radiation;

said second spectral band comprises at least one of a short wave infrared (SWIR), medium wave infrared (MWIR) or a long wave infrared (LWIR) band of said radiation;

said common lens passes radiation in at least a portion of said VIS/NIR band and at least a portion of said SWIR/MWIR/LWIR band;

said first relay lens corrects aberrations within the VIS/NIR band within at least a portion of about 0.4 micrometers to about 1.1 micrometers; and

said second relay lens corrects aberrations within the SWIR band within at least a portion of about 1 micrometers to about 3 micrometers, within the MWIR band within at least a portion of about 3 micrometers to 7 micrometers, or within the LWIR band within at least a portion of about 8 micrometers to about 12 micrometers.

56. (currently amended) The image fusing system according to claim 52, wherein:

~~said common aperture comprises a~~ said beam splitter is arranged to split said radiation into a first optical path and a second optical path; and

said image fusing system further comprises:

a first objective lens in said first optical path between said beam splitter and said first sensor to filter radiation into said first spectral band; and

a second objective lens in said second optical path between said beam splitter and said second sensor to filter radiation into said second spectral;

wherein said target radiation is not filtered by any objective lens until after being split

OFFICIAL AMENDMENT

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OFFICIAL AMENDMENT

into said first optical path and said second optical ~~path;~~ path.

57. (canceled)

58. (canceled)

59. (canceled)

60. (New) The image fusing system according to claim 50, wherein:

said processor electronically combines or fuses said first electronic output and second electronic output at the same time as said beam combining device optically fuses said first optical output and said second optical output.

61. (New) The image fusing system according to claim 52, wherein:

said processor electronically combines or fuses said first and second electronic outputs at the same time as said beam combining device optically fuses said first optical output and said second optical output.